carpentry, and metalwork," "practical courses on marine motors and their installation, net-mending and the preservation and curing of fish," and "business methods" all in continuation evening classes? Surely these are not school subjects, but handicrafts, and surely the attempt to teach them in schools is merely overloading a primary education already burdened by sufficient imperfectly taught "subjects." If these things are to be really useful they must be acquired by a boy in the daily practice of his occupation.

If scientific instruction can be given in addition to the above, so much the better, say the inshore committee. It is proposed that this instruction be given by "occasional lectures." These would explain "the most up-to-date methods as well as the cogency of the case for any newly imposed bylaws." They would "obviate any resentment felt for ordinances" and "convince fishermen of their expediency." Would they? The experience of the Lancashire local committee, which first in England attempted to regulate, by restrictions, a large inshore fishing population was that any attempt to argue for (or explain) by-laws by means of public lecture was fatal at once. But simply to impart, by means of sound laboratory instruction, the main things in the life-histories of marine economic animals—that is, by pure scientific instruction—has gradually effaced the intense hostility to legislative interference which those who began fishery regulation in England experienced. This end has to be attained *indirectly*. It is like the much-discussed question of sex-hygiene instruction. Why not plainly teach human physiology? And must one still apologise in England when he wishes to impart a scientific education?

Certainly methods of preservation, curing, marketing, etc., ought to be described in lectures and informal conferences; certainly methods of fishing in use abroad or in other parts of the country should be demonstrated; certainly the choice and upkeep of motor installations should be the subject of informal meetings and conversations, all these things being described to inshore fishermen by "practical" men or tradespeople. But this is rather organising the industry than educating the fishermen.

J. J.

SECULAR CLIMATIC CHANGES IN AMERICA.[1]

NEITHER the meteorologist nor the geologist commonly realises the extent and importance of the changes which have taken place during the "historic period." The latter is apt to close his investigations with the Ice Age; the former too often concerns himself only with the period of instrumental observations. The intervening "post-Glacial" time is the field of relatively few workers, who are rapidly building up the new science of "Palæoclimatology."

Prof. Huntington's elaborate memoir on the "Climatic Factor" should do much to gain recognition for at least the later stages of this period. From the viewpoint of the "pulsation" theory of climates developed during similar investigations in arid Asia, the author studies the climates and their attendant effects during the last thirty-five centuries over an area extending from California to Guatemala. A study of the ruins of arid New Mexico shows that at three distinct periods prior to the coming of the Spaniards the country was able to support a far greater population than can exist at present; this could only have been possible with a heavier rainfall, permitting the cultivation of regions now too dry for agriculture. The strand lines and gypsum dunes of the Otero Soda Lake and the alluvial terraces of the rivers point to the same conclusion (though the theory that even in rivers reaching the sea terraces and deltas are the result of changes of climate rather than of level will come as a shock to most English geologists).

In America there are no continuous historical records from which the ruins can be dated; this deficiency is supplied in an unexpected way by the measurement of the rings of growth of the giant Sequoias of California, some of which are more than three thousand years old. By means of an empirical formula, Prof. Douglass, in a chapter on a method of estimating rainfall by the growth of trees, has been able to reconstruct the rainfall, for the period over which records exist, with an accuracy of 82 per cent. With the very old trees, however, a number of corrections are necessary, which render uncertain the slope of the curve plotted from the measurements, although they do not impair the evidence of short-period fluctuations. The corrected curve shows cycles of 155 years, of 21·0 years, and of 11·4 years, and in addition three long wet periods, from 1000 B.C. to 300 A.D., from 900 to 1100 A.D., and from 1300 to 1400 A.D., which Prof. Huntington considers must correspond to the three native civilisations of New Mexico.

This curve is next compared with the curve previously published in "Palestine and its Transformations," showing the fluctuations of climate in arid Asia. There is a pronounced agreement between the two curves, especially during the period from 300 to 1000 A.D.

The Maya civilisations of Yucatan and Central America are next investigated—though, since these regions largely suffer from an excess of precipitation, they can scarcely be included in "*arid*" America—and the theory is developed that these extinct civilisations fell in dry, cool periods contemporaneous with the moist periods of New Mexico, both changes being the result of a southward movement of the subtropical anticyclone. The coolness stimulated the Mayan races into activity, and the dryness enabled them to master the forest. The dates of the Maya chronology are not yet satisfactorily worked out, but so far as they go they confirm this correlation. An attempt is made to connect the terrestrial changes with changes of the sun's surface, but the results, which are illustrated by curves, do not appear to

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[1] "The Climatic Factor as Illustrated in Arid America." By Ellsworth Huntington, with contributions by Charles Schuchert, Andrew E. Douglass, and Charles J. Kullmer. Publication of the Carnegie Institution of Washington, No. 192. Pp. v+341. (1914.)

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attain a high degree of definiteness. Discussions by C. J. Kullmer on the shift of the storm track, and by Charles Schuchert on climates of geologic time, complete the volume.

The memoir is written in Prof. Huntington's usual vigorous style, and is well illustrated with photographs, diagrams, and curves. In this connection it must be remarked that although the graphical method of comparison is very valuable, it would have been usefully supplemented in the case of the long series of comparable values by the calculation of correlation coefficients, which give a quantitative measure of the relationship. The vigorous American style, also, is apt to strike English ears harshly, as when on page 73 the author writes: "The present water supply . . . is almost negative, and the possibilities of agriculture still smaller." These, however, are very minor details, and in no way detract from the value of the memoir as a detailed comparative study of several lines of evidence bearing on a subject hitherto somewhat neglected.

NOTES.

The London office of the British Association has learned from the officers of the Association in Australia that the overseas party has safely arrived, and that the meeting is proceeding in accordance with the original programme.

The Meteorological Conference, which was to have taken place in Edinburgh in September, has had to be postponed. A further announcement respecting it will be made in due course.

The International Seismological Congress, which was shortly to have been held at St. Petersburg, has been postponed.

It was stated in our last issue (p. 590) that forms had been circulated by the British Association Committee for Radiotelegraphic Investigation for the use of those who will observe the forthcoming solar eclipse and who were prepared to make notes of "strays" and to record the measurement of the strength of signals, five high-power wireless telegraph stations in Europe having undertaken to make a series of special emissions during the eclipse. The outbreak of hostilities on the Continent will doubtless make it impossible for the programme of proposed emissions to be carried out, and intending recorders of the observations above referred to are therefore informed that the suggestions of the Committee cannot be carried into effect.

The many friends of Prof. W. A. Bone will be distressed to learn of the death, on August 8, at a Leeds nursing home, of Mrs. Bone, which followed upon an operation. Prof. and Mrs. Bone with their family were on holiday at Burnsall, Wharfedale, when the necessity for the surgical operation referred to arose. Mrs. Bone took a deep interest in the progress of science, and subordinated all other considerations to the furtherance of her husband's scientific work. Prof. Bone will receive the respectful sympathy of his scientific friends, and past and present colleagues.

The death is announced, in his eighty-third year, of Prof. F. Humphreys Storer, a distinguished American chemist. In 1853 he served as chemist to the U.S. North Pacific exploration expedition. After studying abroad, he spent several years in practising as a chemist at Boston. From 1865 to 1870 he was professor of general and industrial chemistry at the Massachusetts Institute of Technology, and from 1870 to 1907 he held the chair of agricultural chemistry at the Bussey Institution. He was the author of several text-books of chemistry, two of which were written in collaboration with Dr. C. W. Eliot, the ex-president of Harvard.

We regret to notice the death, on Saturday last, at the age of forty-eight, of Sir Edward Anwyl, principal of the Monmouthshire Training College, and lately professor of Welsh and Comparative Philology at the University College of Wales, Aberystwyth.

It is stated in the *Geographical Journal* that the Swedish Riksdag has voted to the Anglo-Swedish Antarctic Expedition the sum asked for, viz. 1500*l.* a year for five years, on condition that a similar amount is raised in England. Prof. O. Nodenskjöld will assume the leadership of the expedition for the first year and a half. The other members of the staff have not yet been chosen.

It is stated in the *Morning Post* that in future the distribution of the Nobel prizes will take place on June 1 instead of in December, as hitherto. The next distribution has been fixed for June 1, 1915.

The Earl of Londesborough and Mr. E. O. Sachs, of the British Fire Prevention Committee, have circulated a letter appealing for the names and addresses of qualified men prepared to enrol themselves as an emergency fire service force to be placed at the service of the Government for use in our fortified and defended places, our arsenals and national stores, and in certain Government establishments requiring special protection. Retired Fire Brigade officers and firemen —both professional, volunteer and private—and a limited number of Fire Brigade officers and firemen of inland (country) brigades, both volunteer and private, not exceeding three from any one brigade, are needed. It is also proposed to form a supplementary roll of young engineers (used to steam engines or motor-cars) and young surveyors or architects (used to building, survey, or dangerous structure works), who, although not having actual fire experience, would be valuable in an emergency fire service force. Applications for enrolment should be addressed to Lord Londesborough and Mr. Sachs at the offices of the British Fire Prevention Committee, 8 Waterloo Place, London, S.W.

The current number of the *Geographical Journal* contains well-executed process plates of the memorial about to be erected to Captain Scott and the companions who perished with him in the Antarctic, and that of Dr. E. A. Wilson, which was unveiled at Cheltenham on July 8 by Sir Clements Markham. The design of the Scott memorial is the work of Mr. A. H. Hodge, and the general plan is as follows:—A granite pylon is surmounted by a bronze group representing

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